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FROM DISABILITY

The Effect of Disability on Life Satisfaction and Self-Rated Health:

Resilience is Not the Prototypical Pattern

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Abstract

Development is a multi-directional and multi-dimensional process and disability is a major life stressor that affects one's developmental trajectory. Relatively little is known, however, regarding whether individuals display differential trajectories with disability and the role that disability has on domains beyond that of well-being (e.g. life satisfaction), such as health (e.g. self-rated health). To examine this further, we applied growth mixture modeling to 4,155 ($M =$ 60, $SD = 14$, 48% women) individuals from the German Socio-Economic Panel Study who experienced disability. We observed different patterns of changes in life satisfaction and self-rated health to and from disability. Four patterns of how life satisfaction changed were identified: resilient (14%), low and declining (29%), mildly impacted (50%), and high and breaking down (7%). We observed 3 patterns of how self-rated health changed: average and adapting (41%), chronic low (36%), and high and breaking down (23%). Factors associated with greater likelihood of the resilient pattern (high stable levels of life satisfaction) for life satisfaction were older age, being a man, being better educated, less severe disability, being married and greater social participation. Factors associated with greater likelihood of average and adapting for self-rated health were older age, being better educated, less severe disability, being married and greater social participation. Our findings showcase that major life stressors shape individual developmental trajectories differently depending on the domain of functioning. Further, the results suggest that recent calls that resilience being the norm when confronted with major life stressors does not extend to health stressors, such as disability. Our discussion focuses on possible reasons why resilience may not be the norm when confronted with disability, as well as risk and protective factors to consider when building resilience-promoting interventions.

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The Effect of Disability on Life Satisfaction and Self-Rated Health:

Resilience is Not the Prototypical Pattern

Development is a multi-directional and multi-dimensional process that occurs across a myriad of time scales beyond that of age, including pathology, mortality, history, and non-normative event related processes (Baltes, 1987; Hultsch & Plemons, 1979; Wohlwill, 1973). Major life stressors come in all shapes and sizes to impact functioning across domains, ranging from marital transitions of divorce and widowhood to job transitions of unemployment and retirement to health transitions of disease and disability onset (Diener et al., 2006; Luhmann et al., 2012). Most of the research examining the course of change to and from major life stressors has focused on facets of well-being as the outcome of interest (Diener et al., 2006; Lucas, 2007a), whereas relatively little is known regarding whether and how other domains change as a function of major life stressors. In particular, self-perceptions of health is associated with key domains for quality of life, such as functional ability and survival (Idler & Benyamini, 1997), but relatively little is known regarding how this key indicator changes to and from major life stressors. Furthermore, only recently has research moved towards examining subgroups of persons as they change to and from major life stressors (for discussion, see Bonanno et al., 2011). We focus on whether disability onset shapes the course of one's developmental trajectory in the domains of well-being and health and whether people are resilient or able to maintain high levels of functioning when confronted with disability. To examine our research questions, we apply growth mixture modeling to longitudinal panel survey data from the German Socio-Economic Panel Study (SOEP) to identify subgroups of persons in how life satisfaction and self-rated health changes to and from disability. We additionally include socio-demographic factors and personal and social resources to examine whether they are associated with one's ability to maintain their levels of functioning in the face of disability.

Moving Beyond Solely Focusing on Change in Well-being to and from Major Life Stressors

The empirical evidence is undeniable that major life stressors have the potential to shape one's developmental trajectory, especially in the well-being domain. For example, divorce, spousal loss, and job loss typically result in substantial declines in well-being (Carr et al., 2001; Lucas et al., 2003, 2004) and sustained lower levels in the years thereafter. However, a majority of research examining change to and from major life stressors has almost exclusively focused on facets of well-being. This begs the question; what about other domains of functioning, are they also affected by major life stressors? Domains beyond that of well-being, such as perceptions of health, leisure activities and engagement with social network members should likely be influenced by the onset of a major life stressor.

In the present report, we examine how disability onset shapes the course of change in self-rated health, in addition to life satisfaction. We focus on self-rated health because this indicator is a reliable and strong predictor of functional ability and mortality across adulthood and old age (see Idler & Benyami, 1997; Idler & Kasl, 1995). Self-rated health broadly encompasses one's cognitive processes involved in basing their health assessments from a wide range of sources, such as culture, age, and reference groups (Jylhä, 2009). Previous research examining changes in self-rated health has primarily focused on examining change over chronological age. For example, empirical evidence suggests that self-rated health remains relatively stable in midlife and into old age (McCullough & Laurenceau, 2004; Morack, Infurna, Ram, & Gerstorf, 2013; Sargent-Cox, Anstey, & Luszcz, 2010), with strong declines in older ages and close to death (Gerstorf, Ram, Lindenberger, & Smith, 2013). It is largely an open question, regarding whether and how self-rated health changes to and from major life stressors. Although self-rated health is relatively stable across adulthood and old age, this indicator could be influenced by the course of changes in the health domain, such as disability onset. Disability results in substantial and sustained declines in life satisfaction (e.g., Lucas, 2007b) and we hypothesize that it will most likely affect the subjective evaluation of one's own health. For example, disability onset may result in substantial and sustained declines in self-rated health

because individuals' frame of reference may change by no longer being able to compare their own health to their peers, with their health being the poorest.

We argue that there are several reasons for focusing on domains beyond that of well-being when examining the influence of major life stressors on development. First, development is multi-directional and multi-dimensional (Baltes, 1987). Depending on the major life stressor, domains may show differential trajectories of change. For example, the prototypical pattern of change for well-being may be maintenance of high levels to and from disability, whereas self-rated health may show a trajectory characterized by substantial declines and sustained lower levels. Well-being may be preserved, but self-rated health may be more sensitive to change as a function of disability onset. In a similar vein, a multivariate approach can provide valuable insights to how prominent domains change, such as social networks and relationships. For example, a meta-analysis by Wrzus and colleagues (2013) found that facets of social networks change as a result of major life stressors, including widowhood, divorce, job entry, relocation, and transition to parenthood. These results suggest that domains beyond that of well-being are sensitive to changes due to major life stressors. Finally, the main focus of well-being may stem from the adult resilience literature, where researchers have solely defined being resilient as maintenance of high levels of well-being or components of mental health (e.g., anxiety, depression, and PTSD symptoms). This may be specific to the literature focusing on adulthood and old age. In comparison, the resilience literature focusing on childhood, adolescence, and young adulthood already includes a multi-dimensional approach to resilience (see Luthar & Brown, 2007). For example, resilience is not only defined has maintenance of well-being, but also as absence of substance abuse, cognitive development, motor development, and adaptive behaviors (Luthar & Brown, 2007; Rutter, 2006, 2012). We hope to move towards this bridging of the literatures by examining whether and how life satisfaction and self-rated health change to and from disability.

Resilience in the Face of Major Life Stressors

We will examine whether there are patterns or sub-groups of how life satisfaction and self-rated health change to and from disability. Bonanno (2004) argues that most individuals are resilient when faced with major life stressors, with resilience operationalized as showing high well-being or no distress and no mental health problems. When confronted with major life stressors, the general consensus used to be that substantial declines in functioning occurred, with maintenance of high functioning (deemed resilience), being uncommon (Bonanno, 2004; Masten, 2001). The research from Bonanno and colleagues has challenged this, showing that most people are supposedly resilient despite major life stressors, such as natural disasters, bereavement, divorce, and unemployment (Bonanno, Westphal, & Mancini, 2011). There are three other patterns that Bonanno conceptualized and has identified in previous research. First, there are individuals who report sustained low levels of functioning as a result of major life stressors, this pattern is named *chronic*. For example, 15% of individuals followed a trajectory of low levels of life satisfaction to and from spousal loss (Mancini et al., 2011). Second, there could be maintenance of functioning up to the major life stressor, followed by a *delay* in declines following a major life stressor. For example, 19% of people experienced stability in life satisfaction prior to divorce, but showed strong declines in the years following (Mancini et al., 2011). Lastly, there could be a substantial drop in functioning as a result of the major life stressor, but individuals may be able to *recover* and return back to previous levels in the years thereafter. This sub-group may not have the resources to maintain functioning in the time surrounding the life stressor, but over time (years) would return back to previous levels as shown by 10% of participants' trajectory of depressive symptoms following spousal loss (Galatzer-Levy & Bonanno, 2012).

Role of Health Stressors in Shaping the Course of Development

Previous research identifying patterns of change to and from major life stressors has focused chiefly on natural disasters and marital and job transitions, not health stressors, such as disability that become more common and prominent in midlife and especially in old age

(Crimmins & Beltrán-Sánchez, 2010; Freedman, Martin, & Schoeni, 2002). An unanswered question is whether resilience in the face of disability is the prototypical pattern. In this context, it can be expected that the typical pattern would be of substantial and sustained declines in life satisfaction and self-rated health (Boyce & Wood, 2011; Fauth et al., 2012). For example, Lucas (2007b) observed that disability resulted in declines in life satisfaction (–0.63 *SD*), with individuals typically exhibiting sustained lower levels thereafter. Similarly, multiple studies have observed that well-being declines with cancer and stroke onset, with people typically exhibiting sustained lower levels subsequently (Costanzo et al., 2009; Haley et al., 2011; Infurna et al., 2013).

Patterns of change *to and from* health stressors, such as disability, have not yet been investigated. In the few existing studies of resilience following health stressors, pre-event data have been lacking. For example, Bonanno and colleagues (2012) observed that following spinal cord injury, resilience was the prototypical pattern in depressive symptoms and anxiety. In samples of cancer patients recently diagnosed with breast or colorectal cancer, maintenance of high levels of mental health following the diagnosis was the most common pattern (Helgeson, Snyder, & Seltman, 2004; Hou et al., 2010). It is largely an open question whether these patterns of resilience following health stressors can be replicated using measures of well-being (as opposed to distress) and self-rated health, taking into account pre-disability change, and following participants for longer periods of time both prior to and following disability onset.

We argue that maintenance of high levels of life satisfaction and self-rated health will not be prototypical with disability. Disability challenges individuals in ways different to other major life stressors (i.e., marital and job transitions). For example, disability alters day-to-day living; Zautra and colleagues (1990) found that individuals who were disabled experienced more undesirable events and fewer desirable events on a daily basis compared to individuals who recently lost their spouse and a control group. Additionally, disability could be the result of a cascade of undesirable prior circumstances, involving chronic stressors or declining functional

health (Wheaton, 1990). The long-term consequences of disability could involve pain and frequent visits to the doctor, inhibiting one's ability to effectively cope and regulate their emotions (Charles, 2010). Maintaining high levels of self-rated health may be particularly difficult as limitations in functional abilities and disability affect subjective perceptions of health and may lead to stigmatization by others as disability can be observed by other people (Jylhä, 2009). Finally, besides adapting and learning to live with one's disability, individuals may not have the chance to alter their loss in functional health, whereas with marital or job transitions, it may be more within one's control to find a new partner or job. Changes in the frequency of daily (un)desirable events, declining functional health and controllability of the situation, suggests that disability may challenge individuals in ways different to other major life stressors, resulting in a decreased likelihood of maintaining high levels of life satisfaction and self-rated health.

Risk and Protective Factors

There are various risk and protective factors that may increase or decrease one's likelihood of maintaining high levels of life satisfaction and self-rated health despite disability onset (Bonanno et al., 2011; Zautra et al., 2008). Older age, gender, less severe disability, and personal and social resources may increase the likelihood of maintaining high levels of life satisfaction and self-rated health despite disability. Experiencing disability in young adulthood and midlife may be considered an "off-time" event, resulting in the inability to be resilient, whereas older adults may expect health decrements, resulting in maintenance of well-being and self-rated health (Wurm, Tomasik, & Tesch-Römer, 2008). In contrast, people in very old age may have fewer resources to draw from when facing disability, resulting in more substantial declines in overall functioning (Smith & Baltes, 1997). Disability severity could impact one's ability to be resilient, with a less severe disability resulting in the maintenance of an active lifestyle. Individuals who attain more years of education possess better adaptive and compensatory strategies that they can use to buffer against the negative impact of functional impairments on well-being and self-rated health (Adler et al., 1994). Social participation in one's

community may provide opportunities to mobilize resources for informational and instrumental support to help with new challenges due to disability (Zautra et al., 2008). Finally, women may be more integrated within their social network and may be having more social support, this can protect against the negative impact of health decrements on well-being and self-rated health (Taylor et al., 2000).

The Present Study

To examine patterns of life satisfaction and self-rated health to and from disability, we apply growth mixture models (GMM) to longitudinal data from the SOEP. Recent research has incorporated GMM to examine patterns or subgroups of persons to and from major life stressors, including marital and job transitions (for discussion, see Bonanno et al., 2011). GMM tests whether the sample under study consists of discrete subgroups, permitting for moving beyond solely focusing on model-implied change. In our specific interest, we are able to examine whether there are persons who are able to maintain high levels of functioning (i.e., resilient) or show declines with disability onset, but are able to return back to their previous levels of functioning (i.e., recovery). First, we examine whether there are different patterns in how life satisfaction and self-rated health change to and from disability. We hypothesize that because disability is a qualitatively different event than previously studied major life stressors, most individuals will not be able to maintain high levels in life satisfaction and self-rated health. Second, we examine whether socio-demographic factors, severity of disability, and social participation predict pattern membership. We hypothesize that younger age, being a woman, less severe disability, and greater social participation will each be associated with resilience.

Method

We examined our research questions using data from 28 waves (1984 – 2011) of the SOEP. Comprehensive information about the design, participants, variables, and assessment procedures in the study is reported in Wagner et al. (2007). A brief overview of details relevant to the present analysis is given below.

Participants and Procedure

The SOEP is a nationally representative annual panel study of private households and their inhabitants initiated in 1984 and covers ~50,000 residents of former West and East Germany, including immigrants and resident foreigners. Potential participants were randomly selected from a set of randomly selected locations in Germany where all family members older than 16 years of age within each household were eligible for participation. Relatively high initial response rates and low longitudinal attrition provide for an overall sample that is representative of the population living in private households. Data were primarily collected via face-to-face interviews and self-administered mail questionnaires.

For the present study, we analyzed data from the 4,155 participants who (a) were not disabled at study onset, (b) experienced disability during the course of the study, and (c) provided data on our measures of interest. Participants were, on average, 60 years of age at disability onset ($SD = 14.40$, range $18 - 99$), had attained, on average, 11.16 years of education ($SD = 2.31$, range $7 - 18$), 48% were women, and 68% were married/partnered at disability onset.

Measures

Life satisfaction. Participants' reported on their life satisfaction annually, answering the question "How satisfied are you with your life, all things considered?" using a 0 (*totally unsatisfied*) to 10 (*totally satisfied*) rating scale. This item is considered a measure of cognitive-evaluative (as opposed to emotional) aspects of well-being and it has been used widely in psychological research (see Gerstorf et al., 2008).

Self-rated health. Self-rated health is given on an annual basis beginning in 1992. Participants' reported on their self-rated health, answering the question, "How would you rate your health at the present time?" The item was answered using a 5-point Likert scale from 1 (*bad*) to 5 (*very good*) and has been widely used in the social and behavioral sciences (for overview, see Idler & Benyamini, 1997).

Disability. Disability was determined from a single item assessed annually, which asks whether participants had been "officially certified as having a reduced capacity to work or being severely handicapped" (see Lucas, 2007b). Disability indicators were based on self-reports, but referred to official certifications of the German legislation. Disability onset was the wave at which individuals reported being disabled for the first time (i.e., did not report prior disability). We only included participants whose reported severity of disability was 20% or higher, which is based on official documentation (Wilcken, 2011). Each individual's time series was re-aligned to disability onset and we used observations attained 5 years prior to and 5 years following disability because this is the time period that we were interested in for our research questions. Table 1 shows life satisfaction and self-rated observations to and from disability. On average, participants provided 8.21 ($SD = 2.11$, range: 2 – 11) life satisfaction observations and 7.32 ($SD = 2.62$, range: 1 – 11) self-rated health observations over the 11 year interval used in this report.

Risk and protective factors. Table 2 shows descriptive statistics for the socio-demographic factors, severity of disability, and social participation that we used to predict patterns of change. When participants indicated that they were disabled, they were given a follow-up question regarding the *severity of disability*, which ranged from 20% to 100%. For example, a rating of 20%-40% is given if someone experiences breathing problems while performing moderate activities because of a chronic illness (problems causing the disability must be present for 6 months and longer); a rating of 100% could be assigned to someone who lost a limb (BMAS, 2006). *Social participation* was measured using a 4-item index assessing participants' frequency of involvement in or attendance at social networking and community activities (see Infurna et al., 2011), answered on a 4-point Likert scale: 1 (*each week*), 2 (*each month*), 3 (*less often*) to 4 (*never*) and reverse coded and averaged with higher scores indicating greater social participation. Our index represents the resources individuals have prior to disability as the observation prior to disability was used.

Statistical Analysis

We used GMM to examine patterns in how life satisfaction and self-rated health change to and from disability. GMM is a type of latent growth curve model that simultaneously estimates trajectories of change and sub-groups of individuals that represent distinct multivariate normal distributions (Ram & Grimm, 2009). GMM tests whether the population under study consists of discrete groups of individuals with differing profiles.

Figure 1 graphically illustrates the three parts of the latent basis growth curve model we used: pre-disability level, pre-disability change, and post-disability change. First, life satisfaction and self-rated health levels may vary 5 years prior to disability, *pre-disability level*. Second, *pre-disability change* quantifies the total amount of change in life satisfaction and self-rated health preceding disability (year –5 to year 0). Lastly, *post-disability change* quantifies the total amount of change in life satisfaction and self-rated health following disability (year 0 to year 5). We estimated separate latent factors for pre- and post-disability change (as opposed to estimating linear and quadratic change), so that we could get separate estimates for the *total amount of change* that transpired in the years leading up and following disability onset. For each latent factor, a mean and variance parameter was estimated. The factor means describe the extent of change (i.e., population-mean level change) and the variance indicates the extent to which there are between-person differences in the observed factor means.

Our analyses consisted of several steps. First, we fit the baseline model (shown in Figure 1) to identify a univariate single-group growth model. Second, in successive models, we allowed the factor (i.e., pre-disability level, pre-disability change, and post-disability change) (1) means, (2) means and variances, and (3) means, variances, and pattern of change (i.e., parameters $A_k[t]$ to vary across sub-groups). Sub-groups ranged from 1 to 4. To select the best fitting model, we used multiple fit statistics, including information criteria (e.g., AIC), entropy, and interpretation of the patterns for each model and whether or not they showed differences between one another (see Morack, Ram, Fauth, & Gerstorf, 2013; Ram & Grimm, 2009). After selecting the best fitting model, we included socio-demographic factors, severity of disability,

and social participation to predict pattern membership. Separate analyses were done for life satisfaction and self-rated health to determine the best fitting model for each outcome. All models were estimated using *MPlus* (see Muthén & Muthén, 1998–2007), with incomplete data accommodated using full information maximum likelihood.

Results

Change in Life Satisfaction to and from Disability

We found that the 4-pattern solution, where the means, variances, and latent basis estimates varied between patterns provided the most parsimonious fit to the life satisfaction data (see bold column in Table 3). This was based on information criteria (e.g., AIC, BIC, and ABIC), entropy, and interpretation of each of the patterns as compared to the 3-pattern solutions. Figure 2 shows the trajectories of change in life satisfaction from the best fitting model and Table 4 provides the model parameters. The four patterns were not evenly distributed and we classified them as resilient, low and declining, mildly impacted, and high and breaking down. The resilient pattern was characterized by high levels of life satisfaction five years prior to disability ($\mu_{00} = 8.05$) and sustained high levels throughout with little change prior to ($\mu_{10} = -0.11$, $p > .05$) and following ($\mu_{20} = -0.03$, $p > .05$) disability. On the opposite end of the spectrum was the low and declining pattern, who showed low levels of life satisfaction five years prior to disability ($\mu_{00} = 5.89$), strong declines preceding disability ($\mu_{10} = -0.96$, $p < .05$) and sustained lower levels thereafter ($\mu_{20} = 0.20$, $p > .05$). The μ_{10} and μ_{20} parameters should be interpreted as the total amount of change in life satisfaction over the five years preceding and following disability. For example, in the low and declining pattern, life satisfaction dropped, on average, 0.96 points on a 0 to 10 scale in the five years preceding disability, whereas over the five years following disability, life satisfaction increased 0.20 points. The largest sub-group was mildly impacted, which exhibited slight declines preceding disability ($\mu_{10} = -0.26$, $p < .05$) and sustained lower levels following disability ($\mu_{20} = -0.19$, $p < .05$). Finally, the least common pattern was high and breaking down, which was characterized by high levels of life satisfaction

in the five years leading up to disability ($\mu_{00} = 7.76$), but strong declines in the year surrounding disability ($\mu_{10} = -2.17$, $p < .05$) and a slight increase, but still sustained lower levels in the years thereafter ($\mu_{20} = 0.41$, $p < .05$).

We next included socio-demographic factors, severity of disability, and social participation as predictors of patterns, where resilient was the reference because this was the most desirable trajectory (pattern membership in model with predictors: resilient = 15%; low and declining = 26%; mildly impacted = 52%; high and breaking down = 7%). Table 5 shows the results from this analysis. Younger age, being a woman, being less educated, not being married/partnered, greater severity of disability, and lower social participation were each associated with increased likelihood of exhibiting the low and declining, mildly impacted, or high and breaking down patterns, compared to resilient. The odds ratios in Table 5 are interpreted in respect to one-unit changes. For example, a one-unit increase in social participation was associated with a 63% and 77% decreased likelihood of being in the mildly impacted and low and declining patterns, as compared to the resilient pattern, respectively. For variables that are categorical, such as gender, being a woman was associated with an 81%, 51%, and 78% increased likelihood of being in the mildly impacted, low and declining, and high and breaking down patterns, as compared to the resilient pattern, respectively.

Change in Self-Rated Health to and from Disability

Table 6 shows results from a series of models focusing on changes in self-rated health to and from disability; the 3-pattern solution that allowed the factor means, variances (covariances), and latent basis estimates to differ between sub-groups provided the most parsimonious fit to the data. This was based on information criteria (e.g., AIC, BIC, and ABIC) and interpretation of each of the patterns. Figure 3 shows trajectories of change in self-rated health to and from disability for the three patterns and Table 7 shows the parameter estimates from the model. Similar to life satisfaction, the three patterns were not evenly distributed and we classified them as, average and adapting, chronic low, and high and breaking down. We note that for the average

and adapting pattern, we had to restrict the variance parameter for the post-disability slope to zero for model convergence. The average and adapting group showed average levels of self-rated health prior to disability (μ_{00} = 2.94), declines in the years preceding disability (μ_{10} = –0.65, $p <$ .05) and increases in the years thereafter (μ_{20} = 0.45, $p <$ .05). Similar to life satisfaction, the μ_{10} and μ_{20} parameters should be interpreted as the total amount of change in self-rated change over the five years preceding and following disability. For example, in the average and adapting pattern, self-rated health dropped, on average, 0.65 points on a 1 to 5 scale in the five years preceding disability, whereas over the five years following disability, self-rated health increased 0.45 points. The chronic low group displayed low levels of (μ_{00} = 2.69) and declines in self-rated health prior to disability (μ_{10} = –0.25, $p <$ .05) and sustained lower levels thereafter (μ_{20} = –0.01, $p >$ .05). The least common pattern was high and breaking down, which displayed relatively stable and high levels of self-rated health prior to disability (μ_{00} = 3.13), but a substantial decline in the year surrounding disability (μ_{10} = –0.68, $p <$ .05) and sustained lower levels and declines in the years thereafter (μ_{20} = –0.43, $p <$ .05).

We next included socio-demographic factors, severity of disability, and social participation as predictors of patterns, where average and adapting was the reference (pattern membership in model that included predictors: average and adapting = 47%; chronic low = 35%; high and breaking down = 18%). Table 8 shows the results from this analysis. Factors associated with greater likelihood of belonging to the average and adapting pattern were being older, being more educated, less severe disability, being married, and greater social participation. Again, the odds ratios in Table 8 are interpreted in respect to one-unit changes. For example, a one-unit increase in age (from the grand mean center of 60) was associated with a 3% and 5% increased likelihood of being in the chronic low and high and breaking down patterns, as compared to average and adapting, respectively.

Discussion

The objective was to examine patterns in how life satisfaction and self-rated health change to and from disability and predictors of those patterns. Changes in life satisfaction were represented by four distinct patterns: resilient, low and declining, mildly impacted, and high and breaking down. In contrast to research on natural disasters and marital and job transitions (Bonanno et al., 2011), resilience was the pattern with the second fewest proportion of participants (14%); twice as many people had the least favorable trajectory characterized by low levels of and strong declines in life satisfaction prior to disability, with sustained lower levels thereafter (29%). The most common pattern was mildly impacted (50%), which reflected slight declines in life satisfaction preceding disability and sustained lower levels thereafter. The least common pattern, high and breaking down (7%), was characterized by maintenance of high levels of life satisfaction prior to disability, followed by a substantial drop in the year surrounding disability onset and sustained lower levels thereafter. Younger age, being a man, being more educated, being married/partnered, lower severity of disability, and greater social participation were all associated with an increased likelihood of being resilient.

We found that changes in self-rated health to and from disability were characterized by three patterns, with no empirical evidence to suggest for a resilient subgroup characterized by maintenance of high levels of self-rated health. The most common pattern was a slight decline in self-rated health in the years preceding disability, followed by slight increases in the years thereafter (average and adapting, 41%). The second most common pattern displayed sustained lower levels of self-rated health, both prior to and following disability (chronic low, 36%), with a similar high and breaking down group as to life satisfaction being the least common pattern (23%). Factors that promoted a more desirable profile were older age, more education, less severe disability, and social participation.

Our discussion focuses on the importance of taking a multi-directional and multi-dimensional approach to examining change to and from disability (and more broadly major life

stressors), why resilience may not be the norm with disability and factors that promote resilience to health stressors.

Moving Beyond Solely Focusing on Change in Well-being to and from Major Life Stressors

Our overarching goal was to advance the literature examining change to and from major life stressors by targeting whether and how self-rated health (in addition to life satisfaction) changes to and from disability. The rationale is grounded in lifespan development theory, which postulates that development is multi-directional and multi-dimensional (Baltes, 1987). Realigning change in both life satisfaction and self-rated health to and from disability can provide insights that cannot be easily gained from a more traditional age-based perspective (Gerstorf et al., 2010; Ram et al., 2010). For example, life satisfaction and self-rated health are relatively stability when examined over age, whereas our findings showcase that they are indeed sensitive to pathology-related processes, such as disability. Examining change to and from disability (and more broadly major life stressors) is a powerful research design because it permits for targeting periods when individuals and their environments are most taxed (Bolger et al., 2003), yielding insights into their regulatory capacities. A multivariate approach to studying developmental change beyond that of age and in relation to pathology-related processes can provide valuable insights into how there may be differential sensitivity in the degree to which domains change to and from major life stressors. We showed that domains beyond that of well-being, such as self-rated health, show a different pattern with disability onset than life satisfaction.

Life satisfaction. In contrast to conceptual models and empirical evidence focusing on well-being changes to and from major life stressors (e.g., Bonanno et al., 2011), maintenance of high levels of life satisfaction (or resilience) was not the prototypical pattern in the aftermath of disability. Our findings also contrast with patterns of mental health following spinal cord injury and cancer diagnosis, where most individuals were apparently resilient (Bonanno et al., 2012; Helgeson et al., 2004; Hou et al., 2010). More specifically, only 14% of participants were likely

to maintain high levels of life satisfaction to and from disability, whereas previous research on spousal loss, divorce, and job loss has identified 59%, 72%, and 69% of persons to be resilient, respectively (Galatzer-Levy et al., 2010; Mancini et al., 2011). The studies focusing on spousal loss, divorce, and job loss, even used the same dataset as us, SOEP, to test their research questions. We additionally did not find a pattern resembling recovery or life satisfaction levels returning back to previous levels following disability, which is in contrast to previous conceptual and empirical research that has discussed recovery as a potential outcome following major life stressors (Bonanno, 2004; Zautra et al., 2008).

Concerning those belonging in the low and declining pattern, it is possible that individuals with some functional limitations early on progressively get worse over time, until they crossed a threshold and became disabled. Lower levels of and declines in life satisfaction could also be indicative of a below average living situation prior to disability (Diener & Seligman, 2004). For example, individuals could already be in poor life conditions, such as having unstable employment, relying on social welfare programs (Luhmann & Eid, 2009), and engaging in poorer health behaviors and coping patterns (Pressman & Cohen, 2005).

The large proportion of participants showing the mildly impacted pattern suggests that most individuals are slightly affected by disability; they do not show the stable high functioning that Bonanno (2004) defines as resilience. Individuals exhibited slight declines preceding disability (–0.26 total from year –5 to year 0), with life satisfaction levels, on average, 6.38 at disability onset (year 0). 6.38 is $d = -0.29$ percentiles less than the national German average of 6.90 ($SD = 1.81$) reported in 2002 (Gerstorf et al., 2008). The stability following disability was close to relatively "average" levels of life satisfaction. We note that it is impressive for individuals to maintain relative stability despite experiencing disability, especially in contrast to the low and declining and high and breaking down patterns.

The high and breaking down pattern showed similarities to that of resilience prior to disability but instead of maintaining high levels, there was a substantial and sustained decline in

life satisfaction in the time surrounding disability onset. It is possible that the cause of disability could have been dramatic or sudden (e.g., accident). For example, a car accident or accident in the workplace that resulted in losing a limb would lead to a considerable change to their day-to-living and purpose in life. Also, following disability, the sustained lower levels could be due to not having the psychosocial resources available to return back to previous levels of functioning.

Self-rated health. We observed that three patterns emerged for how self-rated health changed to and from disability, average and adapting, chronic low, and high and breaking down. In contrast to life satisfaction, the three self-rated health patterns were more evenly distributed in membership and their trajectories were more similar to one another, especially in the years following disability. Average and adapting and chronic low patterns displayed similar trajectories of change with the main difference being the average and adapting pattern showing increases in self-rated health in the years following disability onset. This provides evidence to suggest that the average and adapting sub-group were able to recover following disability, possibly due to having the resources available to recover and adjust to living with a disability.

The pattern with the fewest proportion of participants and the most dramatic amount of change in self-rated health was high and breaking down. The nature of disability onset most likely resulted in a qualitative shift in one's functioning, reflected particularly in self-rated health. We do not know the cause or source of the disability, but this could affect one's ability to maintain self-rated health prior to disability onset. Individuals belonging to this pattern, their cause or source of disability may have been more immediate or sudden, such as loss of limb due to accident, as compared to a chronic illness that took several years to develop and accumulate to disability certification.

Broadly speaking, it is possible that the disability certificate confirms individuals' subjective evaluation of their present state of (chronic) health situation. This could explain the very low levels of self-rated health across the three patterns as compared to previous studies using the SOEP. The levels of self-rated health for all three patterns following disability are

substantially low, as compared to previous research using the SOEP, where the sample average for self-rated health was 3.40 (*SD* = 0.90; see Infurna et al., 2011). This provides evidence to suggest that something is clearly wrong or occurring prior to disability. Furthermore, self-perceptions of health can also include conceptions of time-line, consequences, and controllability of different conditions (Leventhal, Idler, & Leventhal, 1999). In the specific case of disability status, this may be the result of a prior chronic illness that becomes progressively worse over time (Jylhä, 2009), resulting in self-rated health being lower compared to the general sample.

Resilience in the Face of Major Life Stressors

There may be several reasons why resilience for life satisfaction and self-rated health was not prototypical when individuals were confronted with disability. First, disability may be qualitatively different than previously studied major life stressors. Disability results in the need for severe (and sometimes permanent) life-style modifications that directly influence relatedness and independence, such as maintenance of employment and social relations and long-term consequences of pain and inability to perform activities of daily living (e.g., cooking, bathing; Verbrugge & Jette, 1994; Wurm et al., 2008). Therefore, disability could be an end point of a cascade of events that take place over several years (or even a decade), such as chronic illness and hospitalization. Second, when disability is reached, it may differentially disrupt daily living habits or routines. For example, individuals who are disabled are more likely to experience undesirable life events (Zautra et al., 1990), such as having to stop a hobby, sport, or recreational activity, having to change occupations, or moving to a new residence and away from one's accustomed area. Decreases in the availability and pleasure derived from day-to-day experiences could operate as additional stressors that constrain well-being and perceptions of health. Third, disability could result in experiencing greater daily negative affect and slower recovery from stressors due to lack of psychosocial resources (Costanzo et al., 2012; Piazza et al., 2007). In sum, our findings suggest that disability disrupts the life course qualitatively differently than other major life stressors due to pre- and post-disability circumstances.

Our findings indicate the need for caution in global assertions that resilience is common (Bonanno, 2004) for several reasons. The first is that people's propensity to show resilience will vary with the seriousness of the adversity experienced (see Luthar & Brown, 2007). Studies suggesting that resilience is the prototypical trajectory have typically focused on events such as marital transitions and job loss. As we have discussed above, these events do not necessarily precipitate a chain of further negative life events, as would experiences of significant disability. Our findings establish the importance of refraining from claims that individuals have the innate ability to be resilient, as this is likely to differ across stressors.

The second reason to avoid broad statements about prevalence rates of resilience is that diagnoses of resilience necessarily depend on how it is defined. In this study as in many others, we defined resilience in terms of self-reported life satisfaction. Had we included additional criteria to define "doing well" - such as absence of depression and anxiety or levels of substance use - the proportion of people showing stably high functioning, across all domains, would plausibly have been still lower across major life stressors (see Luthar & Brown, 2007). To curtail the use of only one dimensionality, we included a measure of self-rated health to examine whether other prominent domains that are key for quality of life show similar patterns to and from disability. Unlike our findings focusing on life satisfaction, self-rated health did not show a pattern of resilience.

Risk and Protective Factors

Factors associated with the more desirable patterns for each outcome (i.e., resilient for life satisfaction and average and adapting for self-rated health) were older age, being a man, more education, being married/partnered, less severe disability and greater social participation. Disability in young adulthood and midlife could be more debilitating to day-to-day living, especially in the context of supporting one's family, the capacity for gainful employment, as well as being considered a less expected off-time event due to health decrements in old age being considered more or less normative (Wurm et al., 2008). A more severe disability could be

directly linked to the seriousness of the limitation associated with the disability. According to the official guidelines in Germany (BMAS, 2006), a 20% to 40% severity of disability would constitute being impaired doing moderate activities due to chronic illnesses, whereas a 75% or 100% is associated with e.g. having lost a limb. This can have direct implications for maintenance of day-to-day living and social network embeddedness. For example, needing help with activities of daily living could result in stopping hobby or sport activities and possibly even re-locating to accommodate one's disability, resulting in a change in one's access social network members. Attaining more years of education is associated with adaptive and compensatory strategies that can be utilized in times of stress to mitigate burdens and preserve well-being (Adler et al., 1994). Men were more likely to be resilient, which could be due to disabled men getting support from their wives more than disabled women getting support from their husbands (Taylor et al., 2000). Lastly, greater social participation being associated with resilience is consistent with previous research where social support was associated with better adjustment following major life stressors, such as spousal loss (Bonanno et al., 2011). Social participation may provide individuals access to informational and instrumental resources to assist in adjusting to disability, as well as emotional support that would aid with discussing new problems associated with disability (Zautra et al., 2008). More broadly, resilience-promoting interventions for disability should focus on individuals who have various socio-demographic characteristics (i.e, younger age, less education, woman) and fewer resources (i.e., severely disabled and low social participation). Of the predictors included, social participation or aspects of one's social network could be a modifiable component to target for future interventions by improving one's social relations to help mitigate against further declines due to and aid with adjustment to disability.

Future Directions

We note that we are still at the beginning of understanding developmental trajectories to and from health stressors and there are several avenues to pursue in the future. First, future

research needs to examine whether similar patterns are observed for change to and from disease onset, such as cancer and cardiovascular disease, as well as long-term hospitalizations. Are individuals also less able to maintain their life satisfaction and self-rated health in the face of prominent chronic illnesses? Based on our findings, we would expect that resilience not be prototypical. Second, we need to develop ways to study the reasons why resilience is not the norm for disability. One possibility could be through measurement-burst designs because the day-to-day dynamics of living may be off. With disability, individuals' routine may differ due to inability to work and inability to engage in pleasant/enjoyable events (Zautra et al., 1990). Furthermore, there may be differences in emotional reactivity to daily stressors and positive events (i.e., differential susceptibility; Pluess & Belsky, 2013), such that disability results in stronger decreases in well-being as a result of daily stressors, but could lead to being more responsive to daily positive events (i.e., increases in well-being; Zautra et al., 2005). Third, future research needs to examine other prominent domains, such as cognitive functioning and social participation. This is an underdeveloped area of research in regard to health stressors. Is the typical pattern for cognitive functioning one of declines that is typically observed with longitudinal panel surveys (e.g., Spiro & Brady, 2011), or is there evidence for resilience or maintenance of cognitive functioning despite onset of health stressors? Furthermore, following the meta-analysis by Wrzus and colleagues (2013), the social context may be affected by major life stressors and in particular with health stressors, this may result in declines in social integration due to difficulties in staying integrated within one's social network and maintaining and forming social relationships with the onset of the health stressor.

Limitations and Conclusion

We note several limitations. First, the yearly assessment interval could mask the amount of change observed at disability onset (see Uglanova & Staudinger, 2013). More closely spaced observations within the panel survey (i.e., every 3 or 6 months) could enable for better understanding the amount of change and processes involved in resilience. Second, we only

focused on disability onset and did not have information on the cause of disability, which likely greatly varied across persons. Future research is needed to determine whether cause of disability determines one's ability to be resilient. Based on German government statistics of disability certificates, the most common cause of disability is due to chronic illness, followed by born with disability, and work or traffic accident (Wilcken, 2011). This would support the assumption that most people were confronted with worsening health prior to disability due to chronic illnesses, which might be reflected in the low levels of self-rated health reported in the sample. Third, although we aimed to move beyond previous research that has primarily focused on well-being by examining patterns of how self-rated health changed to and from disability, future research is needed to examine other prominent domains. We were limited by the variables available, but to attain a more multivariate perspective, it is imperative to focus on how other prominent domains, such as cognition and psychosocial resources change with health stressors. Fourth, our statistical model did not allow for testing the directionality of whether disability causes changes in life satisfaction and self-rated health or life satisfaction and self-rated health predicts subsequent disability. It is largely an open question as to whether lower levels of and declines in well-being and self-rated health lead to subsequent disability through behavior and coping pathways or that onset of an eventual disability causes declines in these domains (Pressman & Cohen, 2005). Lastly, GMM is a model that permits for examining subgroups or patterns of change that are distinct in the data, but not for explaining the type of change occurring prior to and following disability. For example, for life satisfaction, the low and declining group exhibited declines in life satisfaction prior to disability, future models could isolate these participants and include time-varying and time-invariant predictors to help explain why this change is occurring. In addition, our models for self-rated health should be interpreted with attentiveness. The entropy for the self-rated health models were low to moderate, indicating that differences amongst the groups might be less than we think. The entropy values could be reflective of the trajectories of self-rated health following disability being similar to one another across the three patterns, with

differences being larger in the years preceding disability. Furthermore, we had to restrict the variance for post-slope in the average and adapting group for self-rated health to zero for model convergence. This assumes that participants who belonged to this group did not show variability in their change in self-rated health following disability onset.

Major life stressors shape the course of one's developmental trajectory across adulthood and old age. In contrast to previous research (Bonanno et al., 2011), we found resilience was not the prototypical pattern in life satisfaction and self-rated health for individuals who became disabled. Furthermore, our study sheds light on that fact that depending on the domain of functioning, there are likely to be differences in patterns of change to and from major life stressors, such as disability. Characteristics of the individual are instrumental in promoting resilience despite disability, especially one's point in the lifespan (i.e., age), the severity of the disability and social participation. Our findings point to the need for further research on the mechanisms underlying resilience in the face of significant health stressors, and moving towards a more multivariate approach, as they underscore the need to avoid global statements about overall "rates of resilience".

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Table 1

Descriptive Statistics for Life Satisfaction and Self-rated Health to and from Disability

Time to/from Disability (years)	Life Satisfaction			Self-rated Health		
	Number of Observations	*M*	*SD*	Number of Observations	*M*	*SD*
−5	3,117	6.65	1.89	2,615	2.88	0.91
−4	3,411	6.63	1.89	2,828	2.83	0.91
−3	3,770	6.59	1.97	3.246	2.77	0.93
−2	4,034	6.50	1.96	3,586	2.72	0.95
−1	4,144	6.36	2.05	3,620	2.57	0.95
0	4,144	6.11	2.10	3,918	2.39	0.92
1	3,330	6.17	2.11	3,018	2.47	0.93
2	2,719	6.22	2.08	2,499	2.49	0.94
3	2,165	6.21	2.07	2,005	2.47	0.92
4	1,790	6.18	1.99	1,639	2.47	0.92
5	1,487	6.21	2.07	1,428	2.47	0.93

Note. $N = 4,155$. Participants, on average, provided 8.21 ($SD = 2.11$, range: 2 – 11) life satisfaction observations and 7.32 ($SD = 2.62$, range: 1 – 11) self-rated health observations over this 11-year time period.

Table 2

Means, Standard Deviations, and Intercorrelations Among Risk and Protective Factors Included in the Present Study

	M	SD	1	2	3	4	5	6
1. Age at disability (18 – 99)	59.86	14.40	–					
2. Women (%)	0.48	0.50	0.02	–				
3. Education (7–18)	11.16	2.31	–0.06*	–0.06*	–			
4. Degree of disability (20 – 100)	53.87	22.93	0.24*	0.09*	–0.07*	–		
5. Social participation (1 – 4)	1.52	0.56	–0.13*	–0.03	0.36*	–0.18*	–	
6. Married/partnered (%)	0.68	0.47	–0.02	–0.18*	0.05*	–0.09*	0.05*	–

Note. $N = 4,155$. Age, women, education, degree of disability, and marital status were taken at the wave of disability. Social participation was taken at the wave prior to disability.

*$p < .05$

Table 3
Model Fit Statistics for Growth Mixture Models Determining Number of Patterns of Change in Life Satisfaction to and from Disability.

	1-Class Baseline	2-Class Means	2-Class Means + Variance	2-Class Means + Variance + Pattern	3-Class Means	3-Class Means + Variance	3-Class Means + Variance + Pattern	4-Class Means	4-Class Means + Variance	**4-Class Means + Variance + Pattern**
Sample size										
$N_{c=1}$	4,155	3,904.25	1,886.62	1,878.57	587.02	620.17	2,322.93	203.86	972.33	**1,192.00**
$N_{c=2}$		250.75	2,268.38	2,276.43	220.23	2,336.28	599.22	573.39	908.36	**568.67**
$N_{c=3}$					3,347.75	1,198.55	1,232.85	77.82	1,757.48	**2,087.00**
$N_{c=4}$								3,299.94	516.83	**307.33**
Fit statistics										
# of free parameters	18	22	29	37	26	40	56	30	51	**75**
AIC	128,891	128,602	125,341	125,347	128,402	124,683	124,690	128,303	124,565	**124,441**
BIC	129,005	128,741	125,525	125,582	128,566	124,947	125,045	128,493	124,888	**124,916**
ABIC	128,948	128,671	125,433	125,464	128,484	124,810	124,867	128,397	124,726	**124,677**
Entropy	–	0.881	0.639	0.642	0.760	0.639	0.643	0.785	0.527	**0.646**

Note. $N = 4,155$. The Means only model allowed the means in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups. The Means + Variance model allowed the means and (co)variances in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups. The Means + Variance + Pattern model allowed the means, (co)variances, and pattern of change in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups.

Table 4

Fixed and Random Effects and Latent Basis Estimates for Examining Change in Life Satisfaction to and from Disability

	Resilient	Low and Declining	Mildly Impacted	High and Breaking Down
Sample size	568.67	1,192.00	2,087.00	307.33
Average probability of pattern membership	.799	.840	.788	.720
Life satisfaction stages				
Stage means (*SE*)				
Pre-disability level, μ_{00}	8.05* (0.06)	5.89* (0.09)	6.64* (0.07)	7.76* (0.29)
Pre-disability slope, μ_{10}	–0.11 (0.09)	–0.96* (0.11)	–0.26* (0.06)	–2.17* (0.33)
Post-disability slope, μ_{20}	–0.03 (0.05)	0.20 (0.12)	–0.19* (0.06)	0.41* (0.21)
Factor loadings for life satisfaction $A_k[t]$				
Pre-disability slope				
Time = –5 years	0	0	0	0
Time = –4 years	0.46 (0.26)	0.004 (0.04)	0.06 (0.07)	0.01 (0.04)
Time = –3 years	0.76* (0.37)	0.11* (0.06)	0.27* (0.09)	0.01 (0.04)
Time = –2 years	0.83* (0.33)	0.30* (0.06)	0.67* (0.12)	0.02 (0.04)
Time = –1 years	0.83 (0.54)	0.56* (0.09)	1.14* (0.19)	0.10* (0.04)
Time = 0 years	1.00	1.00	1.00	1.00
Time = 1 years	1.00	1.00	1.00	1.00
Time = 2 years	1.00	1.00	1.00	1.00
Time = 3 years	1.00	1.00	1.00	1.00
Time = 4 years	1.00	1.00	1.00	1.00
Time = 5 years	1.00	1.00	1.00	1.00
Post-disability slope				
Time = –5 years	0	0	0	0
Time = –4 years	0	0	0	0
Time = –3 years	0	0	0	0
Time = –2 years	0	0	0	0
Time = –1 years	0	0	0	0

Time = 0 years	0	0	0	0
Time = 1 years	0.86 (0.65)	0.26 (0.20)	0.21* (0.10)	1.33* (0.27)
Time = 2 years	1.30 (0.87)	0.58* (0.22)	0.40* (0.12)	1.56* (0.33)
Time = 3 years	1.15* (0.58)	0.73* (0.15)	0.84* (0.13)	1.47* (0.28)
Time = 4 years	0.71 (0.45)	0.86* (0.08)	0.85* (0.11)	1.31* (0.21)
Time = 5 years	1.00	1.00	1.00	1.00
Life satisfaction variances and correlations				
Pre-disability level	0.52* (0.12)	2.31* (0.20)	1.67* (0.13)	0.70 (0.36)
Pre-disability change	0.24 (0.12)	3.15* (0.40)	0.78* (0.14)	2.34* (0.77)
Post-disability change	0.11 (0.13)	2.30* (0.50)	0.95* (0.19)	2.27 (1.29)
Pre-disability level – pre-disability change covariance	−0.07 (0.10)	−1.15* (0.22)	−0.34* (0.08)	−0.25 (0.26)
Pre-disability level – post-disability change covariance	−0.07 (0.04)	−0.20 (0.24)	−0.20* (0.09)	0.28 (0.26)
Pre-disability change – post-disability change covariance	−0.01 (0.04)	−0.93* (0.30)	−0.20* (0.08)	−1.76* (0.69)
Residual	0.32* (0.03)	3.38* (0.17)	1.18* (0.07)	0.62* (0.14)

Note. $N = 4{,}155$. The factor loadings for pre-disability level were all set to 1. Pre-disability level refers to levels of life satisfaction 5 years prior to disability. Pre-disability change quantifies the total amount of change in life satisfaction preceding disability. Post-disability change refers to the total amount of change following disability.

*$p < .05$.

Table 5

Likelihood of Belonging in Mildly Impacted, Low and Declining, and High and Breaking Down Patterns as Compared to Resilient Pattern

	Mildly impacted		Low and Declining		High and Breaking Down	
	OR	[95% CI]	OR	[95% CI]	OR	[95% CI]
Age	0.97*	[0.96, 0.99]	0.96*	[0.94, 0.97]	0.98*	[0.96, 1.01]
Woman	1.81*	[1.38, 2.39]	1.51*	[1.10, 2.07]	1.78*	[1.07, 2.95]
Education	0.90*	[0.86, 0.95]	0.86*	[0.81, 0.92]	0.85*	[0.76, 0.95]
Severity of disability	1.02*	[1.01, 1.03]	1.04*	[1.03, 1.05]	1.03*	[1.01, 1.06]
Social participation	0.37*	[0.30, 0.46]	0.23*	[0.16, 0.31]	0.69	[0.47, 1.03]
Married/partnered	0.55*	[0.39, 0.76]	0.34*	[0.24, 0.48]	1.58	[0.82, 3.03]

Note. $N = 4,155$. Reference category is resilient pattern. Age, gender, education, severity of disability, and marital status were each taken from the wave of the reported disability. Social participation was taken at the wave prior to disability. The odds ratios are interpreted in respect to one-unit changes. OR = Odds Ratio. CI = Confidence Interval.
* $p < .05$.

Table 6

Model Fit Statistics for Growth Mixture Models Determining Number of Patterns of Change in Self-rated Health in Relation to Disability.

	1-Class Baseline	2-Class Means	2-Class Means + Variance	2-Class Means + Variance + Pattern	3-Class Means	3-Class Means + Variance	**3-Class Means + Variance + Pattern**	4-Class Means	4-Class Means + Variance	4-Class Means + Variance + Pattern
Sample size										
$N_{c=1}$	4,155	3,690.74	3,378.81	856.17	1,912.49	1,204.48	**1,722.42**	1,786.77	2,241.90	299.77
$N_{c=2}$		464.26	776.19	3,298.83	442.23	1,248.82	**1,480.14**	1,891.43	91.39	1,799.05
$N_{c=3}$					1,800.28	1,701.70	**952.44**	462.23	1,716.10	650.70
$N_{c=4}$								14.57	105.60	1,405.47
Fit statistics										
# of free parameters	18	22	25	36	26	31	**53**	30	39	67
AIC	69,297	69,174	69,111	68,857	69,106	68,303	**68,069**	69,090	68,189	67,944
BIC	69,411	69,313	69,269	69,085	69,271	68,499	**68,405**	69,280	68,436	68,369
ABIC	69,354	69,243	69,190	68,970	69,188	68,401	**68,236**	69,185	68,312	68,156
Entropy		0.717	0.595	0.492	0.504	0.335	**0.374**	0.603	0.644	0.450

Note. $N = 4,155$. For the 2-class means + variance model, the pre-slope and post-slope variance parameters were each set to zero, along with the covariances, across both sub-groups to allow for model convergence. For the 4-class means + variance + pattern model, the pre-slope variance parameter and covariances were set to zero in sub-group 1. The Means only model allowed the means in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups. The Means + Variance model allowed the means and (co)variances in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups. The Means + Variance + Pattern model allowed the means, (co)variances, and pattern of change in pre-disability level, pre-disability change, and post-disability change to differ across sub-groups.

Table 7

Fixed and Random Effects and Latent Basis Estimates for Examining Change in Self-Rated Health to and from Disability

	Average and Adapting	Chronic Low	High and Breaking Down
Sample size	1,480.14	1,722.42	952.44
Average probability of pattern membership	0.681	0.719	0.706
Self-rated health stages			
Stage means (*SE*)			
Pre-disability level, μ_{00}	2.94* (0.05)	2.69* (0.04)	3.13* (0.16)
Pre-disability slope, μ_{10}	–0.65* (0.09)	–0.25* (0.04)	–0.68* (0.18)
Post-disability slope, μ_{20}	0.45* (0.18)	–0.01 (0.03)	–0.43* (0.09)
Factor loadings for self-rated health $A_k[t]$			
Pre-disability slope			
Time = –5 years	0	0	0
Time = –4 years	0.08 (0.04)	0.11 (0.08)	–0.001 (0.05)
Time = –3 years	0.20* (0.06)	0.41* (0.10)	–0.004 (0.07)
Time = –2 years	0.41* (0.07)	0.66* (0.08)	0.001 (0.06)
Time = –1 years	1.01* (0.04)	0.83* (0.07)	0.05 (0.08)
Time = 0 years	1.00	1.00	1.00
Time = 1 years	1.00	1.00	1.00
Time = 2 years	1.00	1.00	1.00
Time = 3 years	1.00	1.00	1.00
Time = 4 years	1.00	1.00	1.00
Time = 5 years	1.00	1.00	1.00
Post-disability slope			
Time = –5 years	0	0	0
Time = –4 years	0	0	0
Time = –3 years	0	0	0
Time = –2 years	0	0	0
Time = –1 years	0	0	0

Time = 0 years	0	0	0
Time = 1 years	0.32* (0.08)	0.44* (0.13)	–0.08 (0.20)
Time = 2 years	0.65* (0.12)	0.88* (0.15)	0.23 (0.25)
Time = 3 years	0.75* (0.10)	0.84* (0.16)	0.47* (0.14)
Time = 4 years	0.92* (0.10)	1.03* (0.13)	0.84* (0.09)
Time = 5 years	1.00	1.00	1.00
Self-rated health variances and correlations			
Pre-disability level	0.46* (0.05)	0.57* (0.03)	0.36* (0.07)
Pre-disability change	0.55* (0.07)	0.27* (0.04)	0.52* (0.09)
Post-disability change	0	0.09 (0.06)	0.26* (0.13)
Pre-disability level – pre-disability change covariance	–0.32* (0.05)	–0.10* (0.03)	–0.19* (0.08)
Pre-disability level – post-disability change covariance	0	0.02 (0.02)	0.11* (0.04)
Pre-disability change – post-disability change covariance	0	–0.05 (0.03)	–0.32* (0.09)
Residual	0.52* (0.05)	0.19* (0.01)	0.42* (0.07)

Note. $N = 4,155$. To allow for model convergence, the post-slope variance and covariances were set to zero in the average and adapting pattern. The factor loadings for pre-disability level were all set to 1. Pre-disability level refers to levels of life satisfaction 5 years prior to disability. Pre-disability change quantifies the amount of change in life satisfaction preceding disability. Post-disability change refers to the total amount of change following disability.

*$p < .05$.

Table 8

Likelihood of Belonging in Chronic Low and High and Breaking Down Patterns as Compared to Average and Adapting

	Chronic Low		High and Breaking Down	
	OR	[95% CI]	OR	[95% CI]
Age	1.03*	[1.02, 1.04]	1.05*	[1.03, 1.06]
Woman	1.22	[0.94, 1.60]	0.83	[0.63, 1.09]
Education	1.05	[0.97, 1.13]	1.09*	[1.03, 1.15]
Severity of disability	1.01*	[1.01, 1.02]	0.96*	[0.96, 0.97]
Social participation	0.09*	[0.05, 0.16]	1.55*	[1.19, 2.03]
Married/partnered	0.85	[0.64, 1.13]	1.47*	[1.12, 1.93]

Note. $N = 4,155$. Reference category is high and breaking down pattern. Age, gender, education, severity of disability, and marital status were each taken from the wave of the reported disability. Social participation was taken at the wave prior to disability. The odds ratios are interpreted in respect to one-unit changes. OR = Odds Ratio. CI = Confidence Interval.

* $p < .05$.

Figure Captions

Figure 1. Graphical representation of the structural equation model and three estimated latent factors: pre-disability level, pre-disability change, and post-disability change. Pre-disability level refers to how individuals may report varying levels of life satisfaction or self-rated health five years prior to disability. Pre-disability change refers to the total amount of change in life satisfaction or self-rated health in the years prior to disability. Post-disability change refers to the total amount of change following disability and whether individuals are able to return back to their previous levels of functioning. The factor loadings for level are all set to 1 and the factor loadings that are not labeled for pre-disability change and post-disability change are freely estimated. We used observations of life satisfaction and self-rated health that were taken five years prior to and five years following disability (Y).

Figure 2. Illustrating the trajectories of change in life satisfaction in relation to disability for the four distinct patterns: resilient (14%), low and declining (29%), mildly impacted (50%), and high and breaking down (7%).

Figure 3. Illustrating the trajectories of change in self-rated health to and from disability for the three distinct patterns: average and adapting (41%), chronic low (36%), and high and breaking down (23%).